



International Partnership
for Hydrogen and Fuel Cells
in the Economy

Singapore Update

40th IPHE Steering Committee Meeting

4 – 5 October 2023

Washington DC, United States

Climate change poses an existential threat to Singapore



- Small, densely populated city-state
- Scarce energy resources
- 1/3 of land less than 5 metres above mean sea level
- Population density about 7,500 pax/km²

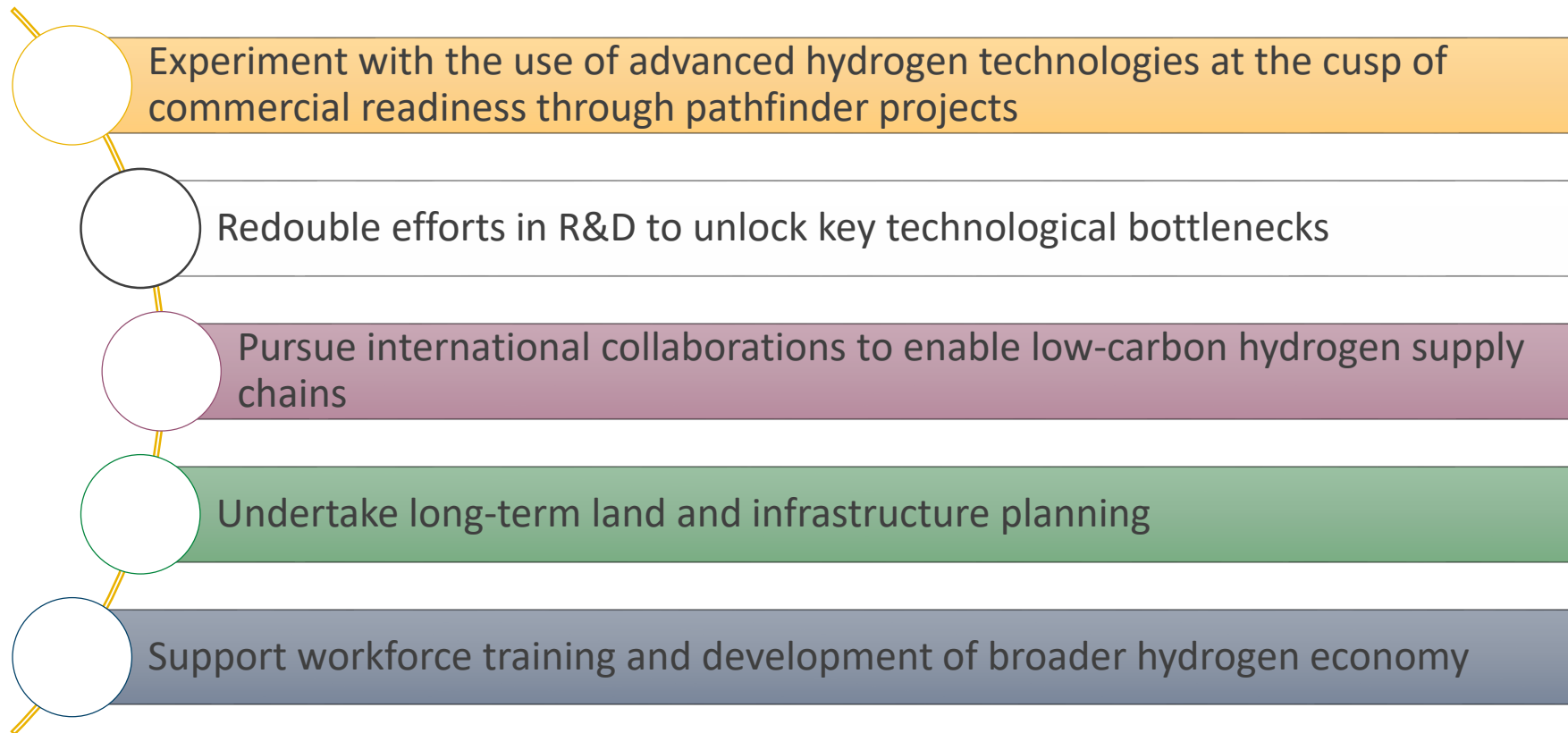


Image credit: The Noun Project



Preparing Singapore for a Hydrogen Future

- Progressively build up domestic capabilities, starting with hydrogen carriers or applications that are more technologically ready, while continuing to monitor market development



Announcements / New Initiatives for *Singapore* [1/2]

- **Investments/Funding/Policies/Initiatives**

- Completion of a study between the Global Centre for Maritime Decarbonisation (GCMD), DNV, Surbana Jurong and Singapore Maritime Academy on safety and operational guidelines for piloting ammonia bunkering in Singapore in end April 2023
- Formation of a Pro-Tem Committee (PTC) under the Singapore Standardisation Programme to assess the prospects of developing hydrogen and hydrogen carriers standard(s)
 - Methanol and ammonia bunkering standard that will cover refueling, operational and safety requirements for delivery of methanol and ammonia
 - Hydrogen refueling standard to guide transportation of hydrogen and operation and safety standards of refueling station
- Development of international strategy for research collaboration



Announcements / New Initiatives for *Singapore* [2/2]

- **New Research & Development, Demonstration and/or Deployment Activities**

- Grant calls launched for Phase 2 of Low-Carbon Energy Research Funding Initiative's Directed Hydrogen Programme, which will focus on 4 areas – safety and regulatory standards, ammonia cracking, ammonia utilization and hydrogen transport and distribution
- World's first ship-to-containership methanol bunkering operation conducted in Singapore between Maersk and Hong Lam Marine in July 2023
- First hydrogen-powered light duty vehicle on trial from 4Q 2023 for one year
- FID reached by Keppel Infrastructure to construct a hydrogen-ready 600MW CCGT power plant, which can take up to 30%-vol hydrogen (blended with gas)
- The Singapore Exchange (SGX) launched its first ammonia swap and futures contracts (with regional focus on Middle East and East Asia) aimed at meeting hedging needs from the power sector on 2 Oct 2023



Examples of Lessons Learned and Impact: *Singapore*

Program initiative, policy, regulation or mandate	Lessons Learned/Outcomes
Ammonia Expression of Interest for power generation and marine bunkering	<ul style="list-style-type: none"> • How government can co-share risk with private sector for deployment of nascent technology • End-to-end supply chain approach vs. focused approach for individual segments of supply chain • Cost vs. sustainability considerations
Directed Hydrogen Programme for R&D	<ul style="list-style-type: none"> • Important to bring academia, industry and government agencies together early in the process to shape research topics • International collaboration is critical – how best to go about it?
Supporting technology demonstration and pilots	<ul style="list-style-type: none"> • Trade-off between casting options wide and supporting broad range of innovation, vs. severe constraints on land



Thank you



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